JOINING FORCES TO MAKE A DIFFERENCE IN STEM LEARNING

Marsha Semmel

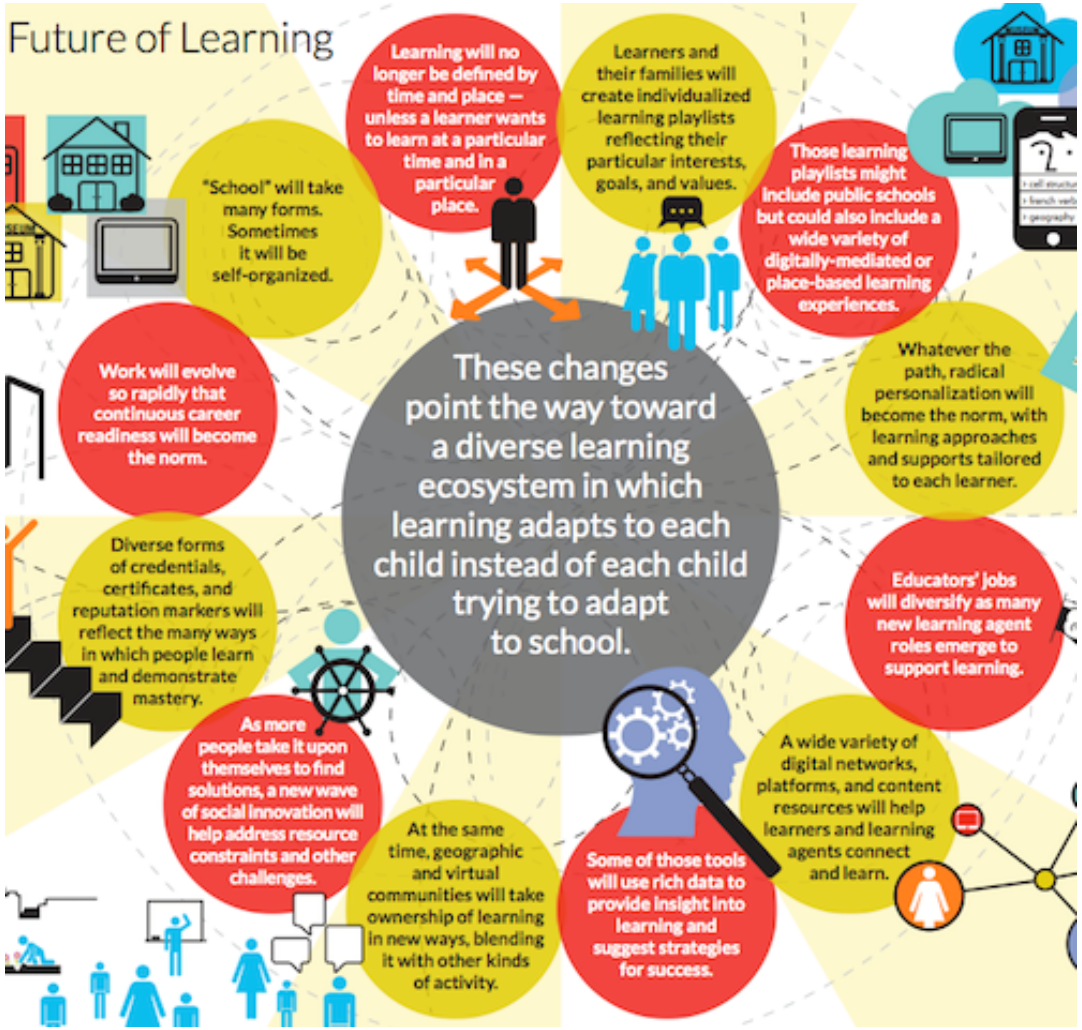
Public Libraries & STEM Conference

Denver

August 20, 2015

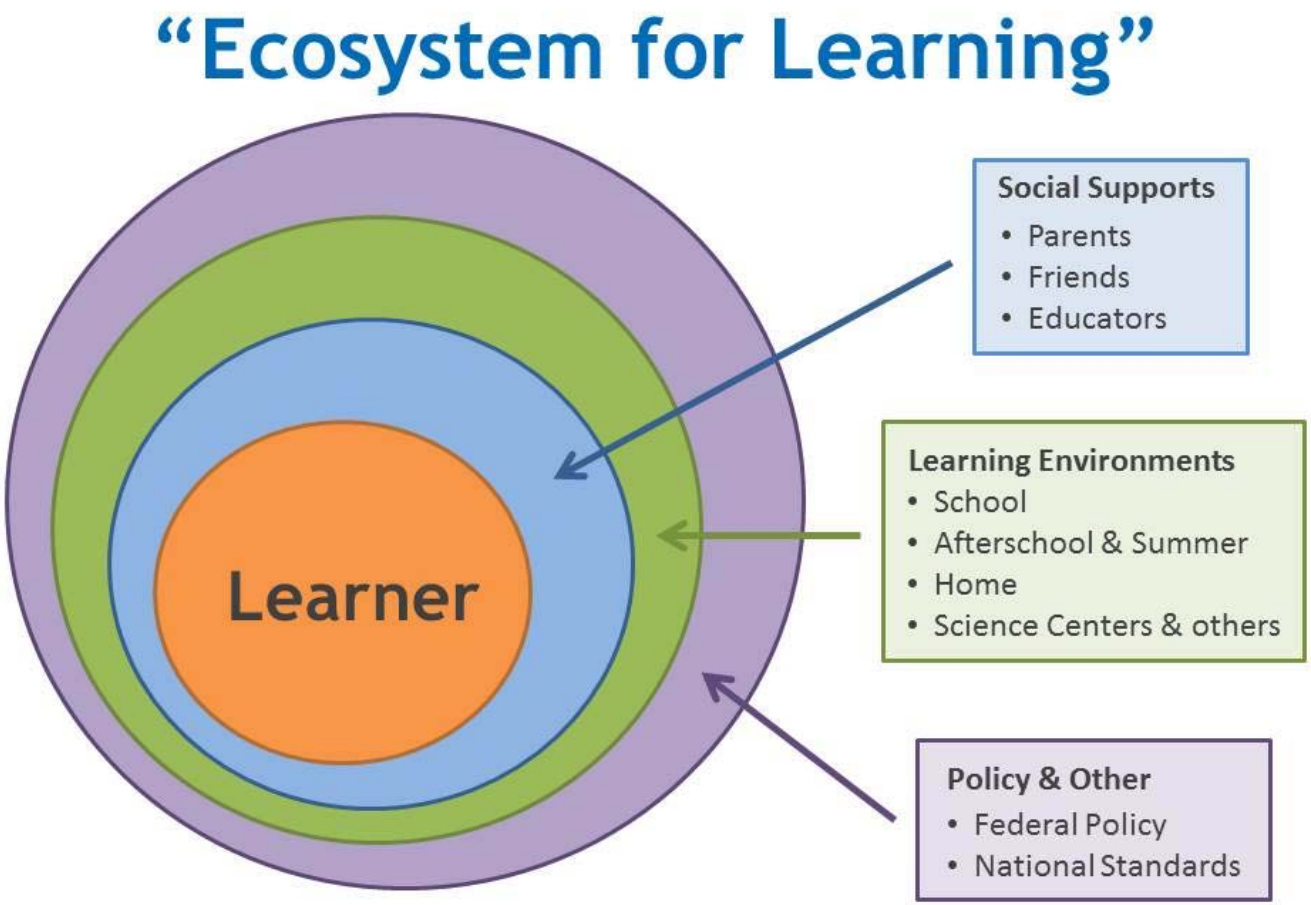
Learning Ecosystems

(KnowledgeWorks)



The STEM Learning Ecosystem

(The AfterSchool Alliance)



STEM Learning as a Complex Challenge

How can we “mesh these contributions [family, friends, mentors, peers, school, church, clubs, libraries, museums, parks, etc.] synergistically rather than duplicatively while adapting models that have worked well in one place to the culture, governance, and idiosyncrasies in other settings?”

Martin Storksdieck,

STEM Learning is Everywhere, NRC 2014

“Complex”/”Wicked” problems

Simple, Complicated and Complex Problems

SIMPLE	COMPLICATED	COMPLEX
Baking a Cake	**Sending a Rocket to the Moon**	**Raising a Child**
The recipe is essential.	Rigid protocols or formulas are needed.	Rigid protocols have a limited application or are counter-productive.
Recipes are tested to assure easy replication.	Sending one rocket increases the like lihood that the next will also be a success.	Raising one child provides experience but is no guarantee of success with the next.
No particular expertise is required, but experience increases success rate.	High levels of expertise and training in a variety of fields are necessary for success.	Expertise helps but only when balanced with responsiveness to the particular child.
A good recipe produces nearly the same cake every time.	Key elements of each rocket must be identical to succeed.	Every child is unique and must be understood as an individual.
The best recipes give good results every time.	There is a high degree of certainty of outcome.	Uncertainty of outcome remains.
A good recipe notes the quantity and nature of the “parts” needed and specifies the order in which to combine them, but there is room for experimentation.	Success depends on a blueprint that directs both the development of separate parts and specifies the exact relationship in which to assemble them.	Can’t separate the parts from the whole; essence exists in the relationship between different people, different experiences, different moments in time.

Source: Westley, F., B. Zimmerman and M. Q. Patton, 2006, *Getting to Maybe: How the World is Changed.*

Evolving Evaluation/Impact Trends

- Program Outputs
- Program Outcomes
- Organization Impact--Public Value
- Collective Impact--System Effects

Perspectives on Outcome Based Evaluation for Libraries and Museums (IMLS, 2002)

"We believe that libraries have a profound impact on individuals, institutions, and communities. How can we engineer a measurement system that will verify our intuition?"

- Peggy D. Rudd
- Director and Librarian, Texas State Library and Archives Commission

Shaping Outcomes (www.shapingoutcomes.org)

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OUTPUTS

Outputs can be thought of as counts of what the program produces. That is, **items or events.**

examples:

1 Trainer hired

4 CDs produced

17,889 Web site hits

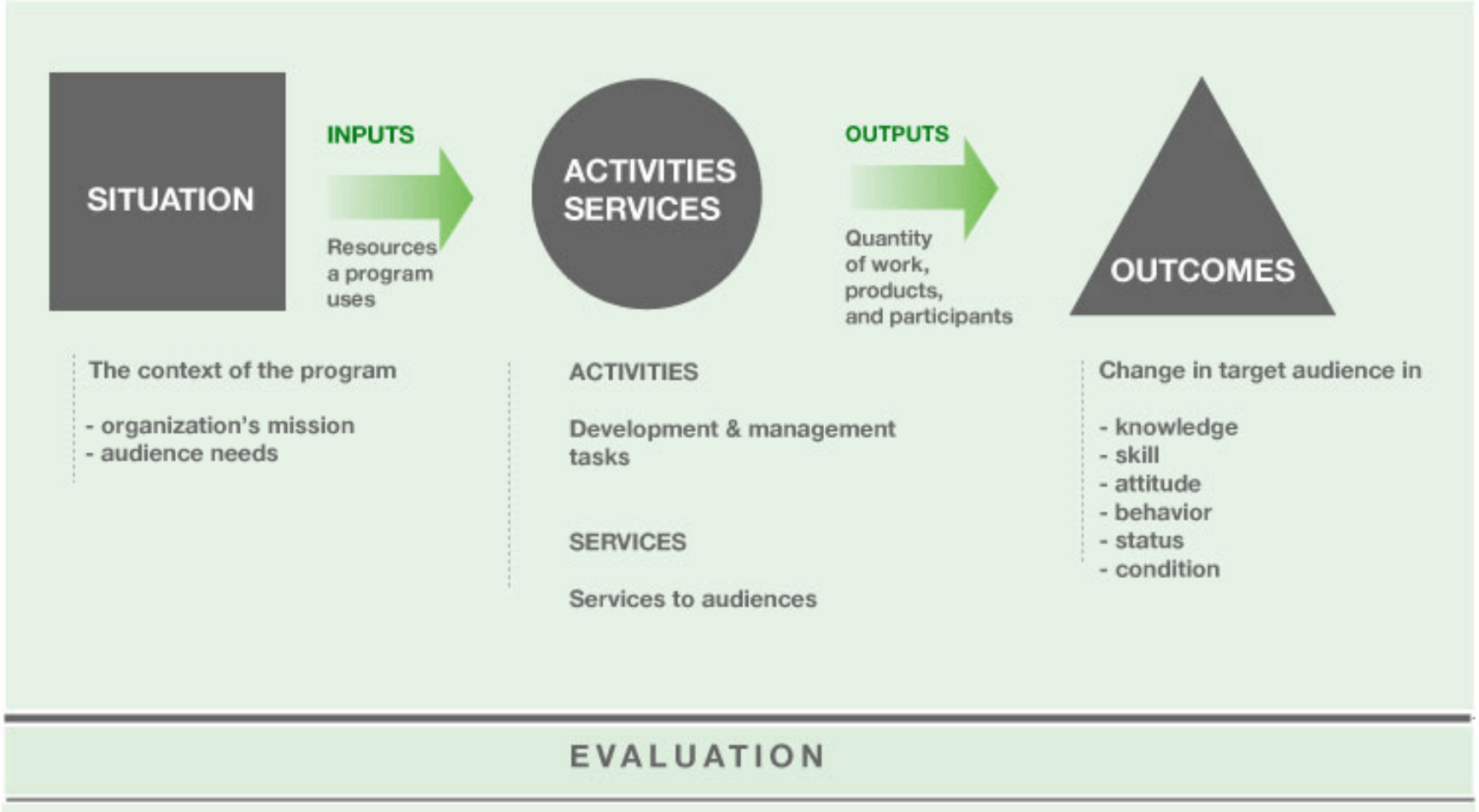
OUTCOMES

Outcomes are the changes the program wants to see coming out of the participants or audiences. That is, changes in **people.**

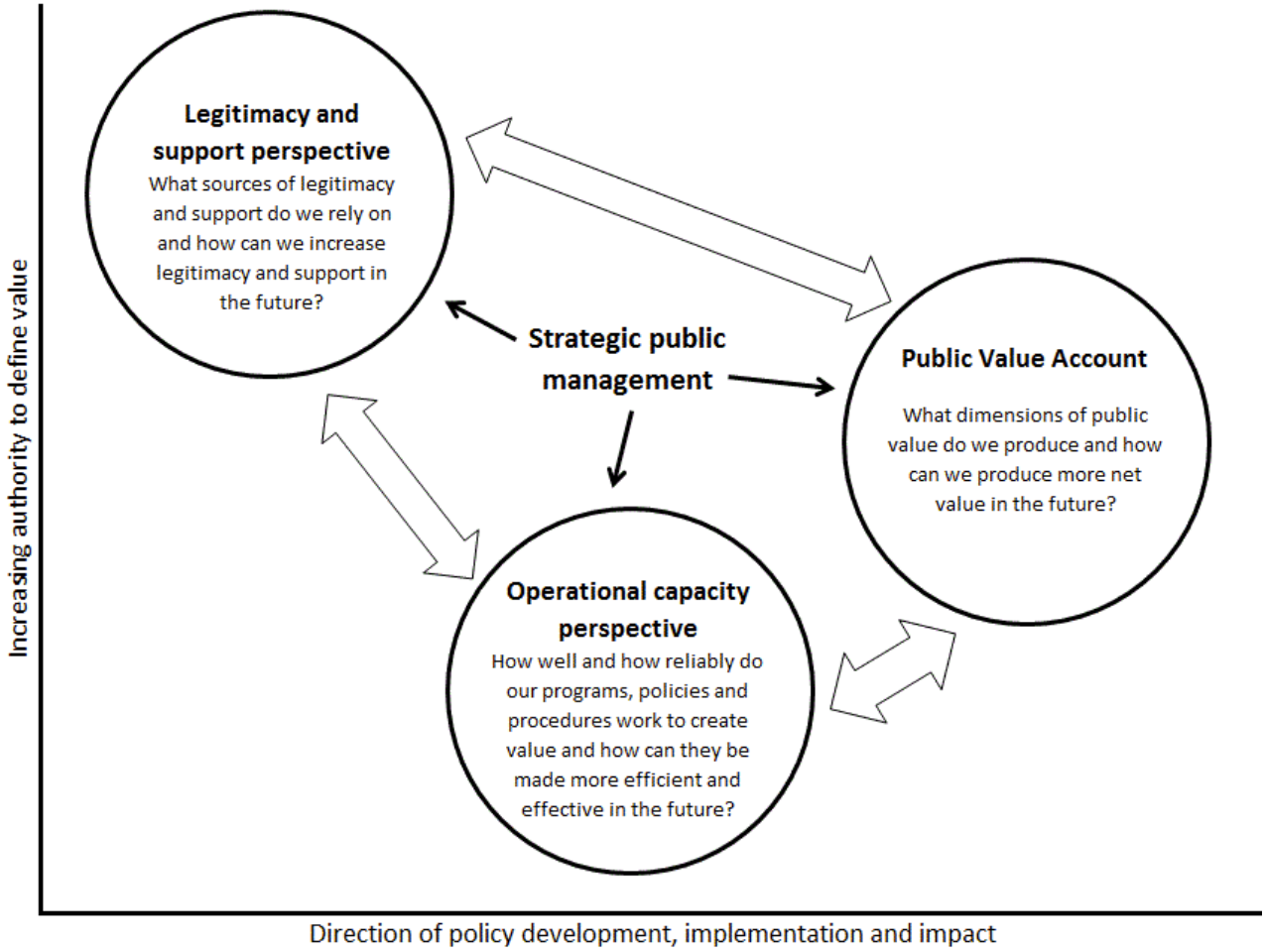
examples:

Parents and children learn about astronomy from hands-on exhibit activities.

Logic Model


SITUATION
INPUTS
Resources a program uses
ACTIVITIES SERVICES
OUTPUTS
Quantity of work, products, and participants
OUTCOMES
The context of the program
- organization's mission
- audience needs
ACTIVITIES
Development & management tasks
SERVICES
Services to audiences
Change in target audience in
- knowledge
- skill
- attitude
- behavior
- status
- condition
EVALUATION

From Program to Organization: Creating Public Value, Mark Moore



From: Recognising Public Value, Mark Moore, 2013

Looking at a System: Collective Impact

From

Organizations loosely collaborating while pursuing their own goals and metrics

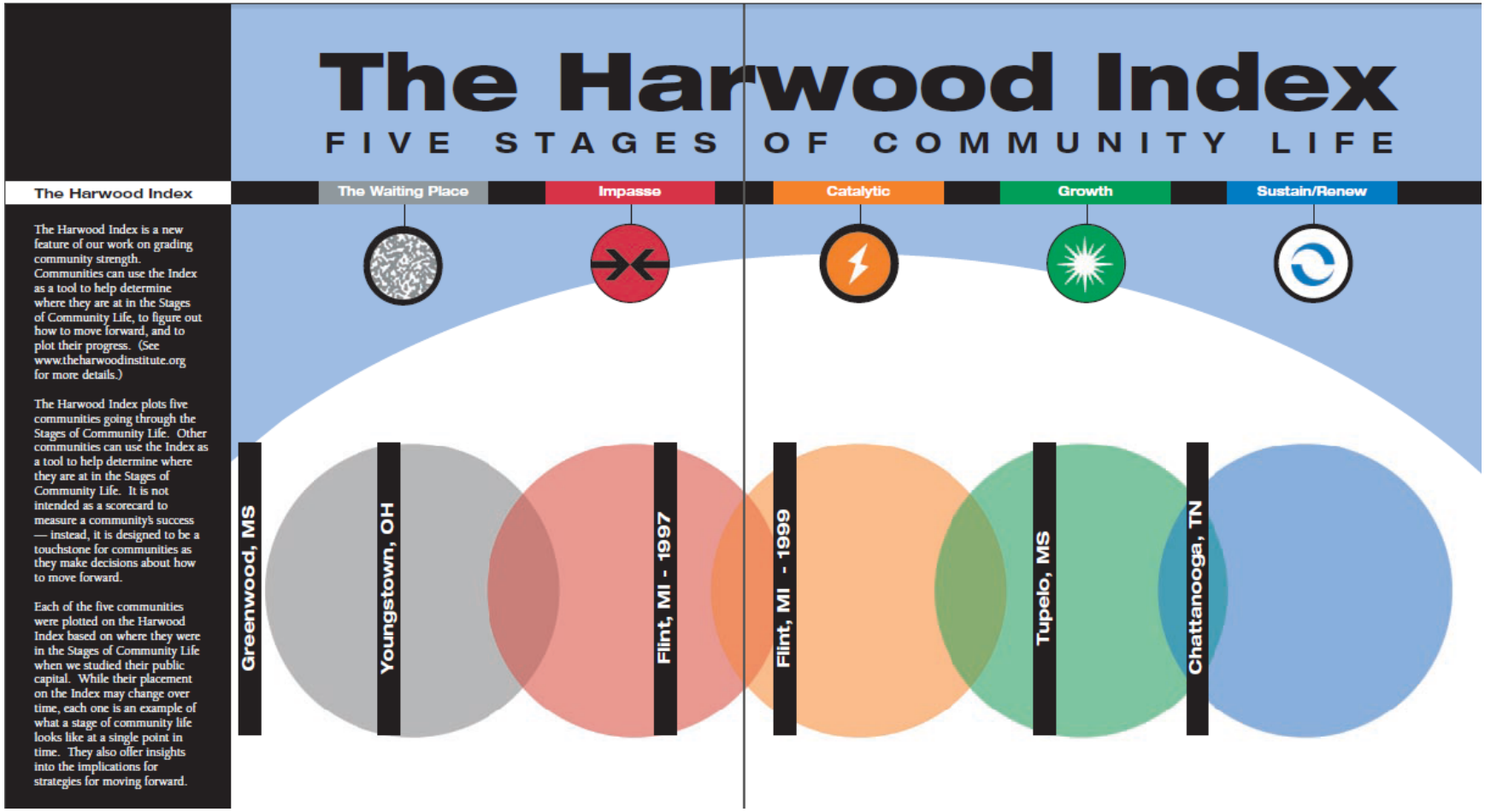
To

Entities pursuing aligned goals and metrics to multiply their collective impact

Collective Impact (FSG, SSIR)

The Five Conditions of Collective Impact	
Common Agenda	All participants have a shared vision for change including a common understanding of the problem and a joint approach to solving it through agreed upon actions.
Shared Measurement	Collecting data and measuring results consistently across all participants ensures efforts remain aligned and participants hold each other accountable.
Mutually Reinforcing Activities	Participant activities must be differentiated while still being coordinated through a mutually reinforcing plan of action.
Continuous Communication	Consistent and open communication is needed across the many players to build trust, assure mutual objectives, and create common motivation.
Backbone Support	Creating and managing collective impact requires a separate organization(s) with staff and a specific set of skills to serve as the backbone for the entire initiative and coordinate participating organizations and agencies.

Community Alignment & Participation



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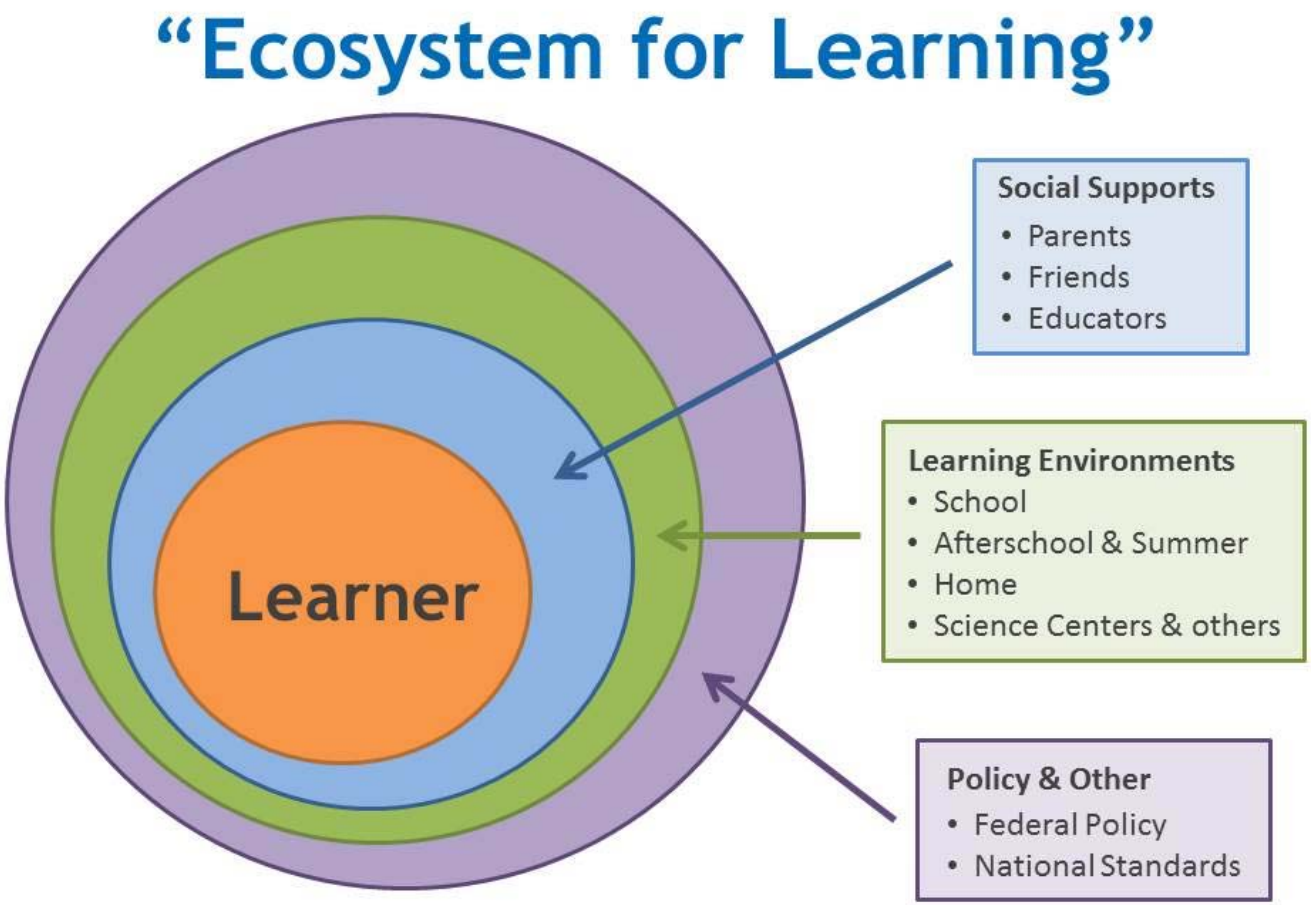
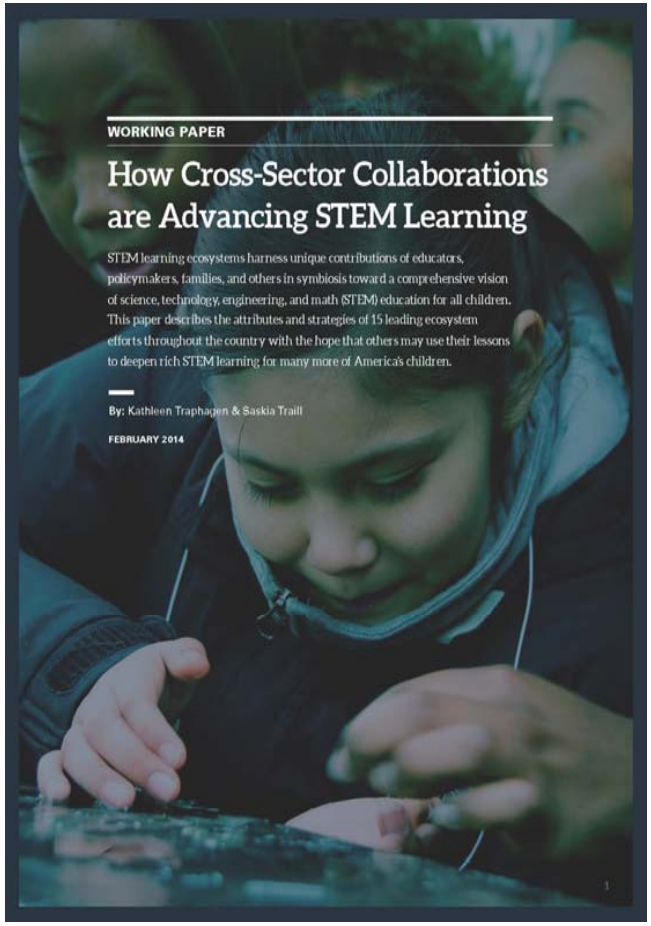


Policy & Funding Priority: Cross-Sector Collaborations (2014)



Emerging STEM Learning Ecosystems Profiled in this Report

1. **AFTERZONE SUMMER SCHOLARS**
   Providence, RI
2. **BOSTON SUMMER LEARNING PROJECT**
   Boston, MA
3. **CALIFORNIA ACADEMY OF SCIENCES, SCIENCE ACTION CLUBS**
   San Francisco, CA
4. **CENTER FOR THE ADVANCEMENT OF SCIENCE EDUCATION, MUSEUM OF SCIENCE AND INDUSTRY**
   Chicago IL
5. **CHICAGO PRE-COLLEGE SCIENCE AND ENGINEERING PROGRAM**
   Chicago, IL
6. **DETROIT AREA PRE-COLLEGE SCIENCE AND ENGINEERING PROGRAM**
   Detroit, MI
7. **EXPANDED LEARNING NETWORK OF THE SOUTHERN TIER**
   Corning, NY
8. **GIRLSTART**
   Central Texas
9. **INDIANA AFTERSCHOOL STEM INITIATIVE**
   Indiana
10. **NEW YORK CITY STEM EDUCATORS ACADEMY**
    New York, NY
11. **ORANGE COUNTY STEM INITIATIVE**
    Orange County, CA
12. **SHINE (SCHOOLS AND HOMES IN EDUCATION) AFTERSCHOOL PROGRAM**
    Carbon and Schuylkill counties, PA
13. **SMILE (SCIENCE AND MATH INVESTIGATIVE LEARNING EXPERIENCES)**
    Oregon
14. **SYNERGIES**
    Portland, Oregon
15. **URBAN ADVANTAGE**
    New York, NY

STEM Funders Network Launches The STEM Ecosystem Grant Program At Clinton Global Initiative/Americas

- DENVER, June 9, 2015 /PRNewswire/ -- The STEM Funders Network (SFN) announced today at the Clinton Global Initiative / Americas Conference that it has launched an ambitious STEM Ecosystem Initiative to catalyze the creation of robust communities of practice in support of STEM, (Science, Technology, Engineering, and Math.) The STEM Ecosystem Initiative will invite existing communities engaged in organized collaboration to apply for grants that will support the cultivation, scale and knowledge transfer of the best practices in building strong connections among a rich array of regional STEM assets with a vision to improve student performance in STEM fields and increase participation in STEM careers.

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Martin Storksdieck,

STEM Learning is Everywhere, NRC 2014

System Leadership

- Ability to see the larger system
- Ability to foster reflection and generative conversations
- Shift from reactive problem solving to co-creating the future.

System Leadership, cont.

- Open mind
- Open heart
- Open will
- “Enable our collective intelligence and wisdom to emerge.”

Thank you very much!

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